<u>**Task Order 07-10 ISS GFE**</u>

1.0 TITLE OF EFFORT: ISS GFE Projects and CFE Quality Support (WBS 1.2.1)

2.0 TASK DESCRIPTION:
Coordinate and conduct S&MA activities for authorized International Space Station Program quality and flight equipment projects (which may include GFE, GSE, CFE, and payloads). Identify and discuss S&MA topics and issues. Participate in all S&MA activities associated with the GFE life-cycle, as defined in EA-WI-023 and EA-WI-025. Provide support to pre and post flight activities as well as to on-orbit operations,
including integrated operations assessments. Review proposals and change requests for system designs and design modifications in order to assess S&MA impacts and identify S&MA issues.

2.1 STATEMENT OF WORK REFERENCE: Section 6.0 JSC Project Support; Section 5 Program Support

2.2 REQUIREMENTS:

2.2.1 ISS GFE Safety and Reliability (WBS 1.2.1.1)
Provide Safety and Reliability support for GFE and ISS payloads.
  a. Participate in development and modification of hardware and software to identify and discuss hardware criticality assessments and define S&MA requirements. Identify design problems and provide design solutions or improvements,
  b. Participate in design reviews, review provided data and documentation, and provide RID'S on S&MA-related issues and deficiencies.
  c. Identify potential hazards, evaluate proposed hazard controls, and evaluate methods for verification of hazard controls.
  d. Identify potential critical items list failure modes, causes, effects, methods of verification, and acceptance rationale.
  e. Track and provide status on requirements verification, system qualification, and design certification activities.
  f. Identify missing or non-compliant S&MA requirements as well as performance requirements that cannot be verified.
  g. Develop preventative maintenance assessments (PMA) to assure that the appropriate actions are in place to maintain hardware functionality.
  h. Conduct S&MA assessments, prepare presentations, and present results of those assessments to S&MA management, project management, and the ISS Program for discussion.
  i. Assure that hardware operational uses, operating limits, hazard controls, and fault tolerance are verified prior to flight.
  j. In accordance with JSC 28035, participate in problem/anomaly investigations during all phases of a project to assure that the problems are appropriately documented; adequate and appropriate investigation is planned and conducted to identify both proximate and root causes; interim and final closure rationale is acceptable; corrective action (if taken) is appropriate and effective; closure documentation (including trend coding) is thorough and complete; and visibility of the problem/anomaly is elevated to the appropriate S&MA management level.
  k. Support operational use of flight GFE. Participate in development of CHIT's that ensure compliance with hazard report and performance requirements.
      a. Submit operational constraints for flight equipment projects, assure the operational constraints are officially approved for each flight in the Operational Control Agreement Database (OCAD), and verify proper implementation.
  l. Supply special assessments (e.g., PRA and trade studies) and involve subject matter experts, as required.
  m. Provide for operational support to the MER and SPIT as needed to resolve issues.

n. In accordance with NT-CWI-004, conduct a risk assessment for shipments with open issues requiring NT management concurrence.

2.2.2 ISS GFE Quality Assurance (WBS 1.2.1.2)

2.2.2.1 Provide In-Line Quality Assurance support for ISS GFE/GSE
a. Perform non-RITF related in-line hardware inspection, verification, and documentation tasks associated with receiving, inspecting, fabricating, assembling, testing, processing, and shipping of GFE/GSE at JSC facilities.
b. Oversee facility maintenance on human-rated chambers and testing labs, and support fit-checks, installation, test readiness, test, and checkout of hardware at JSC and other NASA contractor facilities.
c. Perform in-line support of the Bond Rooms for shipping and receiving of flight hardware.
d. Perform in-line support of the Food Laboratory, Shipping and Receiving of flight hardware, and Non-Destructive Evaluation (NDE).
e. Perform designated Mandatory Inspection Points (MIP's) on ISS hardware/projects at other NASA Centers.
f. Maintain NT QAS IS0 work instructions.
g. Develop and submit Weekly Activity Report to the NASA Monitor of all activities completed or in process.

2.2.2.2 Provide surveillance Quality Assurance for ISS projects/hardware
a. Perform and assign as required designated Government Mandatory Inspection Points (GMIPs).
b. Conduct surveillance of flight systems handling and processing as well as ground facilities with regard to receiving, inspecting, fabricating, assembling, testing, processing, and shipping of GFE/GSE at JSC facilities per the surveillance plan.
c. Participate as team members or team leaders of process and requirements implementation audits conducted at JSC and contractor facilities.
d. Perform surveillance of the Bond Rooms which are responsible for ESCG hardware.
e. Perform, prepare and enter into the appropriate database Surveillance Reports of the ESCG and/or USA in-line activities.
f. Assist QE in analyzing surveillance data including recommendations for necessary audits and level of surveillance for each area of interest based upon surveillance findings.

2.2.3 ISS GFE Quality Engineering (WBS 1.2.1.3)

2.2.3.1 Provide Quality Engineering surveillance support for ISS GFE developed at JSC.
a. Review and approve GFE requirements with respect to ISS requirements and JSC standards and processes.
b. Implement surveillance of GFE design and development process as defined in EA-WI-023.
c. Provide surveillance of JSC processes and products with respect to applicable SLPs, including manufacturing, assembling and testing of hardware and associated Work Authorizing Documents (WADS).
d. Develop GMIP Plans or assign GMIP's to Criticality 1 or 2 WAD'S as applicable in accordance with JSC 63335.
e. Provide surveillance of acceptance for flight (readiness for shipment) process.
f. In accordance with SSP 30695, review acceptance data packages (ADP's) to verify completeness and compliance to ISS requirements.
g. Review and assess GFE readiness for government acceptance. Provide status of readiness in support of System Acceptance Review (SAR).
h. Provide surveillance of receiving, inspection, processing, and shipment of GFE at JSC facilities.

i. Submit surveillance data to PBS, participate in the analysis of the data and generation of the surveillance report. Provide monthly metrics and associated report, including recommendations for necessary audits and level of surveillance for each area of interest based upon surveillance findings.
j. Maintain NT QE IS0 work instructions.
k. Provide administrative function for Quality Steering Team Review (QSTR) Board and associated secure workgroup website.
l. Support weekly staff meetings with respect to significant accomplishments, issues, and schedules.
m. Participate in Test Readiness Review Boards (TRRB's), User Readiness Reviews (URR's), Operational Readiness Reviews (ORR's)? and other appropriate reviews/boards when Criticality 1 or 2 Class I equipment is involved.

2.2.3.2 Provide Quality Engineering in-line support for Space Life Sciences Directorate (SA) Bioastronautics Contract ISS GFE.

a. Review and approve flight hardware and GSE documents and specifications with respect to all facets of quality engineering; e.g., manufacturability, appropriate sequence of events, key characteristics, and appropriate standards. Review and approve GFE requirements with respect to EVA requirements and JSC standards and processes.
b. Review and approve plans, drawings, procedures, processes, controls and inspection requirements.
c. Evaluate inspection/test methods, tools, instruments, and processes.
d. In accordance with NT-PQE-007, identify mandatory inspection points (MIP's).
e. In accordance with NT-CWI-003, investigate nonconformances that have occurred at JSC fabrication and test facilities to understand the cause and effects; determine the appropriate disposition for the nonconforming item(s); determine if the nonconformance meets the criteria for a Reportable Problem in accordance to JSC 28035; and, when appropriate, initiate FIAR's. Review the history of similar nonconformance occurrences.
f. Participate in discussions and meetings with JSC design groups and technical divisions.
g. Provide review and assistance in the development of critical items lists (CIL's) as a derivative of the failure modes and effects analysis (FMEA).
h. Provide quality engineering coverage in selected onsite facilities and test area.
i. Review rejections and/or nonconformances of delivered or manufactured articles. Considerations will include materials, processes, manufacturing methods, inspection and test techniques, handling, and storage.
j. Prepare and/or provide recommendations for revisions to quality assurance plans for selected onsite facilities and tests.
k. Evaluate GFE engineering change requests for quality engineering impact. Provide recommendations for acceptance, rejection, or modification to the changes.
l. Participate in Test Readiness Review Boards (TRRB's), User Readiness Reviews (URR's), Operational Readiness Review (ORR's), and other appropriate readiness reviews/boards.
m. Maintain a current status of work progress and problems and prepare technical briefings to include previous test problems and open items on test articles and facilities that might affect test planning and operation.
n. Review the FCE CCB agenda, identify key issues, and prepare necessary IS&QD inputs to the S&MA board member.
o. Perform in-depth reviews of test plans and procedures.
p. In accordance with NT-CWI-004, participate in Pre-Shipment Readiness Reviews.
q. Review and assess GFE readiness for government acceptance. Provide status of readiness in support of System Acceptance Review (SAR).
r. In accordance with JSC 28035, participate in problem/anomaly investigations during all phases **of** a project to assure that the problems are properly documented. When appropriate, initiate FIAR's. Assure that adequate and appropriate investigation is planned and conducted to identify both proximate and root causes; interim and final closure rationale is acceptable; corrective actions (if taken) are appropriate and effective;

closure documentation (including trend coding) is thorough and complete; and visibility of the problem/anomaly is elevated to the appropriate S&MA management level.

2.2.3.3 Provide Quality Engineering in-line support for Space Life Sciences Directorate (SA) Food Laboratory ISS GFE

a. Participate on PRT.
b. Initiate and close FIAR's/ISOD's.
c. Review all space food TPS's and DR's for content accuracy and validity for Space Shuttle.
d. Review Form 1027's and resolve open items.
e. Review all food lab related drawings for accuracy.
f. Review all space food specifications, as needed.
g. Participate in the Space Food systems sensory panel.
h. Provide disposal of Class 3 food items, as needed.

2.2.4 ISS GFE Software Assurance (WBS 1.2.1.4)

Provide Software Assurance including software safety, software reliability, software quality engineering, software quality assurance, and software verification and validation for GFE flight and ground systems performed at JSC.

a. Define Software Assurance requirements.
b. Ensure the conformance of software life-cycle processes and products to Software Assurance requirements, standards, and procedures.
c. Perform process and product assessment throughout the life-cycle to provide objective insight into the maturity and quality of the software processes and products.
d. Provide support to boards and panels.
e. Ensure that the software safety requirements are clearly identified, documented, traced and controlled throughout the software life-cycle.
f. Perform analysis of the consistency, completeness, correctness and testability of software safety requirements.
g. Ensure the testing of software safety critical components is sufficiently implemented and that applicable controls are in place to verify all safety conditions.
h. Conduct analysis of proposed changes on software safety.
i. Evaluate the reliability of the software products created throughout the life-cycle.
j. Ensure that the software being developed or maintained satisfies the functional and performance requirements.
k. Ensure that each phase of the development process yields the right software products.
l. Participate in major milestone reviews and certification/acceptance of the software.
m. Conduct surveillance of GFE software life-cycle activities.

2.2.5 ISS CFE S&MA

2.2.5.1 ISS CFE Quality Engineering (WBS 1.2.1.6)

Perform CFE Quality Engineering functions in support of the ISS Program.

a. Perform analysis of vehicle engineering Change Requests (CRs) to determine impacts and validity. Provide written reports to ISS Program evaluator.
b. Participate on DCMA Program Panel and other Quality teams (Program and Prime Contractors), as required.

2.2.5.2 ISS GFE/CFE Procurement Quality Assurance

Perform PQA functions at contractors and subcontractors:

a. Review purchase orders to verify proper inclusion of quality requirements and supplier qualifications. Utilize DCMA Quality Leading Indicator Reports to perform risk assessments for product quality requirements flow down with the DCMA letters of delegation.
b. Review purchase orders to determine if Government Source Inspection (GSI) is required. Develop GMIP plans in accordance with NPR 8735.2 and coordinate with DCMA.

c. Review purchase orders to determine appropriate quality instructions.
d. Assure consistency of contractor and subcontractor activities with Federal Acquisition Regulation (FAR) requirements and requirements of NPR 8735.2.
e. Prepare Draft DCMA letters of delegations in accordance with NPR 8735.2
f. Review JSC Purchase Card procurements to verify inclusion of Quality requirement.
g. Manage and support the Procurement Quality Assurance Database.
h. Reconcile existing DCMA RAMP reports with product requirements.

2.2.6 ISS CFE and GFE Audits (WBS 1.2.1.5)
Participate in NASA-sponsored audits. Support NASA-sponsored audits.
a. Provide historical data as to previous ISS audits (audit reports, audit checklists, etc.) to assure consistency of approach by the Audit Management Office and Glenn Research Center.
b. Provide Space Shuttle Program Master Audit Schedule utilizing SAS. This includes support of the Joint Audit Planning Committee in providing Master Audit Schedule information and determining contractor/subcontractor changes.
c. Perform process assessments and audits, and prepare reports documenting results.
d. Perform statistical analysis and benchmark S&MA processes.
e. Perform technical and metric analyses, and present results.
f. Participate in joint audits with other NASA Centers or government entities to verify S&MA requirements and implementation at NASA contractors, subcontractors, and vendors.

2.2.7 ISS Flight Readiness (WBS 1.2.1.8)
Assesses and evaluate data and documentation in accordance with NT-ADM-014 and make recommendations for flight readiness of GFE projects. Specific tasks include, but are not limited to:
a. Data – Records Management
   - Evaluate CCB Change Requests (CR's) and other Program documents to identify flight GFE that has been manifested for flight.
   - Review mission hardware certification length/missions to ensure certification is current for the mission duration.
   - Support GFE engineers in collection and management of data that supports S&MA CoFR evaluation and status reporting in this task order.
   - Implement and manage centralized CoFR endorsement status collection and reporting capability to the frequency defined in NT-ADM-014
   - Evaluate and update NT-ADM-014 to remain current with Program unique CoFR reporting requirements.
   - Track requirements verification and certification status.
   - Assess the configuration and utilization plans against flight certifications.
   - Prepare Certification of Flight Readiness (CoFR) presentations and support to CoFR meetings to discuss status and issues related to MRB's, system acceptance, open items status (1027), data trends, and audit reports.
   - Identify data and information required for accomplishment of S&MA responsibilities and functions leading to flight readiness assessments and CoFR endorsements. Assess adequacy of data and information to support flight readiness activities.
   - Provide status of all open CoFR endorsements, including PRACA and GCAR items, and track the open status through closure to support CoFR presentations.
   - Assess QARC documentation on flight item manufacturing and test results in order to report on the status of these items in support of Flight Readiness.
   - Perform engineering review of flight GFE for its intended application, including launch, landing and on-orbit operations.
   - GFE Records Management in Support of Flight Readiness
   - Staff satellite record centers to maintain configuration, status accounting and accessibility to work authorizing and shipping records and data created by

engineering according to NASA records requirements

2.2.8 ISS Capability Upgrades (WBS 1.2.1.7)

Perform S&MA tasks required to identify requirements and assure requirements implementation for specific ISS Capability Upgrade Projects as defined in eITA No. 7297. ISS Capability Upgrades include Crew Quarters, Total Organic Carbon Analyzer (TOCA), Oxygen Generation System (OGS), Preventive Maintenance (PM) Laptop Software, Regenerative ECLS Contingency Hose (RECH) Pre-Treat Assembly, RECH Water Ops Assembly, and the Potable Water Dispenser (PWD).

2.2.9 Automated Transfer Vehicle (ATV) support (WBS 1.2.1.x)

Provide S&MA support for U.S. GFE cargo to be delivered to the ISS on the European Space Agency (ESA) ATVs.

2.2.10 ISS GFE Safety and Reliability (WBS 1.2.1)

a. Lead U.S. GFE cargo discussions in teleconferences supporting the ATV launch preparations as the discussions relate to certification of U.S. GFE assets.
b. Act as the primary technical coordinator and panel interface for U.S. GFE cargo going to the Flight Equipment Safety and Reliability Review Panel (FESRRQ) ATV Cargo Safety Reviews
c. Attend safety reviews; provide assurance for simplified safety certificates.
d. Generate and track reflight letters to show compliance with ESA-ATV-PR-13830 safety process requirements.
e. Coordinate the review, approval, and tracking of certificates and reflight letters for U.S. GFE cargo.
f. Initiate or respond to requests for clarification or questions regarding U.S. GFE cargo.
g. Generate and periodically update safety requirements and documents.
h. In conjunction with International Partners coordinate the processes, templates, and requirements for U.S. cargo during appropriate teleconferences, internal meetings, and multi-lateral meetings and reviews.
i. Provide technical assurance and tracking of Ground Safety checklists to ALENIA for approval.
j. Evaluate data and information exports to ensure compliance with Export Control Regulations.

2.2.1 1 ISS GFE Flight Readiness (ATV) (WBS 1.2.1.8)

Assesses and evaluate data and documentation in accordance with NT-ADM-014 and make recommendations for flight readiness of GFE projects. Specific tasks include, but are not limited to:

b. Data – Records Management
- Evaluate CCB Change Requests (CR's) and other Program documents to identify flight GFE that has been manifested for flight.
- Review mission hardware certification length/missions to ensure certification is current for the mission duration.
- Support GFE engineers in collection and management of data that supports S&MA CoFR evaluation and status reporting in this task order.
- Implement and manage centralized CoFR endorsement status collection and reporting capability to the frequency defined in NT-ADM-014
- Evaluate and update NT-ADM-014 to remain current with Program unique CoFR reporting requirements.
- Track requirements verification and certification status.
- Assess the configuration and utilization plans against flight certifications.
- Prepare Certification of Flight Readiness (CoFR) presentations and support to CoFR meetings to discuss status and issues related to MRB's, system acceptance, open items status (1027), data trends, and audit reports.

- Identify data and information required for accomplishment of S&MA responsibilities and functions leading to flight readiness assessments and CoFR endorsements. Assess adequacy of data and information to support flight readiness activities.
- Provide status of all open CoFR endorsements, including PRACA and GCAR items, and track the open status through closure to support CoFR presentations.
- Assess QARC documentation on flight item manufacturing and test results in order to report on the status of these items in support of Flight Readiness.
- Perform engineering review of flight GFE for its intended application, including launch, landing and on-orbit operations.
- GFE Records Management in Support of Flight Readiness
- Staff satellite record centers to maintain configuration, status accounting and accessibility to work authorizing and shipping records and data created by engineering according to NASA records requirements

2.2.12 ISS CFE Quality (WBS 1.2.1.x)
a. Design and System Reviews for ISS Hardware
    1. Review Quality Documentation
    2. Write RIDS where quality documentation is missing or is not in compliance with SSP 41173 and sections of SSP 41170
    3. Reconcile any disagreements with Document Creator
b. CoFR Support
    1. Identifying status of H/W manifested for flight to include NASA to NASA, Boeing integration and CMC integration:
        a. Obtain Boeing Tracked Linked Matrix Report and update weekly and track HW to closure
        b. Down load OPMT for Boeing Open Paper related to SCANS, FCA, PCA, AR and D&PB
        c. Contact Vehicle Office and obtain weekly HW status reports; also see EMCR webpage
        d. Query OISR database for open PR/IPR/DR and contact CAPPS techs to monitor closure
        e. Contact CMC Quality Manager to obtain weekly status ports for HW CMC has responsibility
    2. Set up tracking system for H/W that has open paper and track to closure.
    3. Identify by SPRT team all open PRACAs; distribute review form to Vehicle Subsystem Engineer and keep current
    4. Obtain signed PRACA review forms from **NASA SPRT** co-chair with rationale for acceptance or identification of potential constraint
    5. Ensure ISS QA Mgr and Lead are notified of any potential constraints prior to SMARR
    6. Track Closure or ISOD for GFE FIARS that are classified as Station or Bilateral
    7. Review FRA presentation material and insure all open papers agree with GFE; if not reconcile differences
    8. Review IRMA weekly for any QA identified risks
    9. Obtain status of GIDEP Alerts and Advisories from NASA Coordinator and from GFE Hardware Home page
    10. Create and maintain ISS CFE worksheet in GFE Hardware Matrix Integration Report
    11. Create QA Checklist per flight for SMARR, SORR and FRR
    12. Create Exception sheet for HW with open paper that does not have ECD or closure plan
    13. Prepare SMARR presentation for ISS QA Mgr and update for SORR and FRR
c. Provide support for NASA Vehicle Safety to M&P and Payloads ARis/PARIS SPRT Teams
    1. attend telecoms
    2. review and sign off for closure to PRACA
d. Process Improvement
    1. perform research for process improvement activity assigned by the customer

2. create report to include findings and recommendations for improvement
3. current activities:
   a. ISS QA Mgr Survey
   b. Identification of HW providers required to maintain sustaining engineering support

e. On Orbit Quality Assurance:
1. Review IFI database and identify IFIs that should be elevated to GFE FIAR or ISS PRACA and present to customer.
2. Support On Orbit Configuration Working Group

f. Training:
1. Identify, Develop and provide training for Civil Servants, Contractors and DCMA in basic Quality Requirements for ISS.
2. Support DCMA TIMS by providing training resource

2.3 DELIVERABLES
Audit Reports
Technical and surveillance metric analyses
DRAFT Letters of Delegation
COFR Assessments

3.0 PERIOD OF PERFORMANCE: October 1, 2009 - April 30, 2010

4.0 ESTIMATED COSTS:

Contractor may provide travel, training, materials, and other non-labor resources as necessary to support task order requirements. Training may include selected professional discipline-based or spaceflight-based conferences with approval of the TMR.